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TESTS OF THE SLEEP INDUCTION TECHNIQUE

by Arthur Hastings, PhD

The major question we investigated is simply: How well does it work? To find out, we conducted tests on 25 people, using a cassette sleep induction tape supplied by Mr. Monroe. The tape is 45 minutes long, and contains a sequence of the electronically generated sounds, designed to take a person through relaxation to sleep, and then back to wakefulness at the conclusion. These sounds are masked by a sound like ocean surf. Thus, the brain-wave frequencies are heard only subconsciously, or very faintly, behind the masking sound.

The tape was played through a cassette deck or recorder, and listened to on stereo headphones, usually in a darkened room with the eyes closed. Each listener then completed a questionnaire and was interviewed. The questionnaire asked if the person fell asleep, what the depth and quality of the sleep were, how he felt when he woke up, and other questions.

The persons we tested ranged from a one-year-old child to persons over sixty* There were 12 men and 13 women; most (but not all) were college graduates, and their occupations included housewives, college students, a truck driver, executives and industrial workers. The income level was mostly middle-middle class, so the sample is biased toward middle-income and well-educated persons, and we can expect them to be somewhat more verbal and self-conscious in responding to the sleep tapes Of course, we are most interested in whether our listeners fell asleep. Of the 25 persons, 14 (56%) reported that the tape induced sleep comparable to their normal sleep pattern. The tape induced sleep in four additional listeners: one stayed awake on the first playing of the tape, but went to sleep on subsequent trials; two said they dozed off and on; and one lady wrote, "I felt like I was awake, but my husband said I was snoring." (It is a common occurrence in sleep research laboratories for a person to believe he has been awake, when he has actually been sound asleep all night.)

In all, 72% of the listeners fell asleep when listening to the tape. Here are some of the comments of those who slept:

- "Very satisfying. Seemed more complete than my regular sleep."
- "I think that somehow the tape induced feelings of trust and well-being in me."
- "A quality difference...much imagery while falling asleep—sense of being asleep yet still watching or being aware."
- "...great deal of mental activity for first 15-20 minutes of tape... body felt heavy, relaxed. Felt much more awake, clearer, after tape than before."
- I felt that only a few minutes had elapsed; however, 45 minutes had passed."

- After using the tape the first time and sleeping 45 minutes, I did not become sleepy while driving at night...usually I will become sleepy while driving."
- "When the deeper sounds began in the middle of the tape, it was like going down in an elevator."
- "The quality of sleep was much different from my regular sleep, in some way I can't describe."

Of those who fell asleep, 71% said that they went to sleep either about the same or faster than their normal falling-asleep pattern. For most people, the* depth of sleep seemed the same (36%) or lighter (32%) than their regular sleep. One very definite reaction was that people felt less groggy and more awake when they woke up at the end of the tape. This was also true for most of those who were not asleep; they said that they felt very much refreshed and awake afterward. Almost all the persons who tried the tape said that they felt relaxed and tranquil *while* it played, whether they slept or not.

One listener had a quite different response: the moment the tape started, he got more and more awake! This may be a reaction similar to that of persons who are hyperactive or manic, and who are made *more* active by sedatives or tranquilizers.

For some, the induced sleep was not like "normal" sleep, and seemed to have a lighter, more conscious quality, perhaps like meditation or passive attention. Certainly the induced sleep can be resisted by an individual, and may not be effective for a particular person. It seems that the sleep tape did not impose sleep on the listeners, but rather induced a partial sleep state, with relaxation and tranquility, that could then lead to total sleep.

The comments of those who did not fall asleep nevertheless indicate some of the effects of the tape:

I was almost asleep. I stayed awake, anticipating and wondering what the tape would be like. I was concerned with how it would put me to sleep, rather than letting go and sleeping. I felt the tape did bring me to the space just before sleep."

This morning at 3:30 I woke up having an anxiety attack. I" couldn't get back to sleep, so I listened to the tape. I still felt that I wasn't able to get to sleep, but felt less anxiety until—a bit later—I noticed that the eeee sound had disappeared, and that I was 'coming back up. I had indeed been asleep."

"I may have gone into a light doze, but was relaxed."

"I seem to need perfect quiet to fall asleep."

"In certain parts of the tape my mind felt like I was in a deep meditative state; then my mind became impatient with the rhythm. I felt like getting up and doing something. At that particular time, my mind felt completely irritated...I replayed the tape four times. Each time, I received the same reactions. The next morning I woke up completely refreshed, full of energy."

There were a few complaints that the surf-like sound was annoying. There were occasional reactions of boredom or irritation, but no reports of negative-

effects.

Here are the tabulations for the major questions we asked on the questionnaire

A. As compared to my usual falling-asleep pattern, I would say the tape induced sleep

faster	5	20%
slower	4	16%
about the same	5	20%
did not fall asleep	8	32%
does not apply	3	12%

B. I would describe the depth of sleep as compared to my regular sleep as

deeper	3	13%
lighter	7	32%
about the same	6	36%
other	4	18%

C. In comparison to my regular sleep, when I woke up I felt

less groggy or sleepy	9	40%
more groggy or sleepy	6	26%
about the same	6	26%
other	2	8%

Some of our subjects listened to the tape more than once, and we asked them to fill out questionnaires for their responses to subsequent playings. Although the overall pattern was about the same, they did report that they fell asleep faster, slept deeper, and woke up less groggy in comparison with the first time. This suggests that there is a learning effect, and that the tape is more effective with repetition.

The conclusion we can reach from these tests is that the sleep tape does work it induces sleep for a substantial percentage of the people who listen to it. The sleep is relaxing, and people wake up feeling refreshed and wide-awake.

Some do not fall asleep, but they still report that the tape induced relaxation and calmness, and that they felt more wakeful after the end of the tape.

We should remember that the tests were done using a tape recording, rather than the electronic unit. We assume that the latter would be more effective, in that the pulse tones and sequences could be programmed for individual persons.

Also, these tapes were done with the subjects aware that the tape was intended to produce sleep; so we can expect that some of the response, both positive and negative, derives from individual reactions to that information. We tried to reduce the suggestion effect by always saying that "...when they listen some people stay awake, others relax, others fall asleep. There are many effects, and we would like to know what you experience."

Of course, we were primarily interested in how the tape would affect listeners in a context of "sleep induction". What is necessary now is to back up and test the technique, preferably with the electronic unit, in a neutral setting, so that other effects and responses can be observed. The context of sleep may have obscured other potentials of this technique and other potential effects. For example, relaxation states, recharge or alertness effects, and improved mental activity, may be equally important responses that can be induced.

Test and investigations using various sound pulse frequencies and combinations should be carried out in "blind" studies with open—ended comments, responses, and evaluations, so that we shall find out what the patented technique can do, and so that we shall not overlook something important just because we think this is only a sleep induction method.

SCIENTIFIC BASIS: WHAT HAPPENS WHEN A PERSON FALLS ASLEEP?

When a person falls asleep, his or her brain generates a specific sequence of varying patterns (called brain waves), which, scientists assume, reflects what happens to the brain as it falls asleep.

The term "brain waves" refers to the electrical currents generated in the brain by thinking, feeling, moving, running the body, etc. These can be picked up on the surface of the scalp by contact electrodes, processed by an EEG machine (electroencephalograph), and written out in the familiar wiggly lines of the EEG chart.

The following page, taken from *Some Must Watch While Some Must Sleep*, by William C. Dement, M.D., shows the changes in brain waves as a person moves from wakefulness into the stages of sleep and dreaming.

Monroe's sleep inducing technique is to play audio pulses to the person at the same frequency as selected brain wave frequencies, in the blend and sequence in which they occur in the brain

as it falls asleep. The brain apparently attempts to match these pulses and begins to synchronize with them, thus generating its own sleep pattern.

This synchronizing effect may be what is described in brain research as a frequency following response (FFR). Researchers have found that when an audio tone, for example a 500-cycle-per-second (CPS) sound, is played to a person, his brain responds with a 500 CPS electrical pulse. As the loudness of the tone increases, the brain's response is larger and more immediate. A masking sound decreases the strength and regularity of the FFR. Research with the FFR has found it to occur with frequencies from 100 CPS to 2000 CPS.

The brain wave frequencies are much lower than the sound frequencies used in the FFR research. Here are typical classifications of brain waves:

beta: 15 cps and above = awakeness, alertness
alpha: 10-12 cps = relaxation
theta: 4-8 cps = light sleep
delta: 1-4 cps = deep sleep

As a person is going to sleep, the brain-wave frequencies move from the beta range down to low theta and delta. The idea of Monroe's technique is to play pulses at decreasing frequencies to "persuade" the brain to follow them down into sleep. The current method is to generate audio pulses by playing slightly different sounds into each ear.

If one tone is 100 cps and the other is 105 cps, their interaction will produce a pulsing sound of 5 cps. Tones of 500 and 510 cps will create a pulse of 10 cps, and so on. This is called a binaural beat. There are various other ways of generating a pulse beat; comparisons of the effectiveness of different methods should be made.

The FFR effect has not been studied for pulses as slow as these, but studies using EEG recording in conjunction with the sleep frequencies would show whether the response occurs.

Thus, in terms of our current scientific knowledge about sleep and brain processes, we know that the brain waves do follow regular patterns as the person falls asleep. Although there has been no research on inducing brain waves into these patterns, the FFR effect suggests that this is possible, and research studies could confirm and test the effect. This finding would have great impact scientifically, as well as validating the application to sleep induction.

EEG AND CLINICAL TESTS

We were able to test the effects of the sleep tape on brain waves with an EEG machine through the courtesy of the researchers -at the Langley Porter Neuropsychiatric Institute, part of the University of California Medical School in San Francisco. Dr. Joe Kamiya, director of the

Psychophysiology of Consciousness Laboratory, monitored the brain-wave frequencies of one subject as he listened to the sleep tape.

The chart recording showed a typical sleep onset pattern: initial alpha waves, then a slowing of the brain waves with sleep spindles, and finally a pattern of stage 2 and 3 sleep brain waves in the low theta range.

Of course, this would be a normal sleep pattern with or without a tape; but in this case the sequence of sleep brain waves seemed to follow the tape sequence, and the patterns in the various stages suggested that the tape was influencing the subject's state.

The EEG recording also showed unusual patterns about 20 minutes into the tape. These patterns were high-amplitude bursts of 12-13 cycle frequencies, occuring about 4 seconds apart. Dr. Kamiya commented that he had never seen any patterns like them in his years of sleep research. If they are due to the sleep induction technique, he said, the method will be of great scientific interest to brain researchers and sleep researchers.

In view of the apparent effects of the sleep sounds, Dr. Kamiya has expressed interest in including tests of the sleep induction system as part of the ongoing research program of his laboratory. This would include EEG monitoring of many individuals while using the sleep induction technique (with the electronic sound generator rather than a tape), comparison with normal sleep onset patterns, and devising the most effective blends of sounds and sequencing for particular and general sleep needs.

We also discussed the sleep induction technique with Dr. Christian Guilleminault, a neurologist and specialist in sleep disorders with the Sleep Clinic of the Stanford University Medical School, one of the major centers of sleep research in the world. Dr. Guilleminault expressed great interest in the sleep induction technique, and asked to be kept informed on the development of the method. He commented that sleep researchers would find any method for controlling the stages of sleep to be extremely useful, particularly in treating sleep disorders such as insomnia.

EEG tests on the brain—wave effects of the frequency pulses are also being conducted by the research division of the Veterans Administration Hospital in Topeka, Kansas, under the direction of Dr. Stuart Twemlow. Tests have been conducted with four subjects since November 1, in an attempt to find out if the brain waves do begin to match the pulsed frequencies; that is, if there is a frequency following response to the pulse sounds. (The FFR is described in the section on the Scientific Basis of the technique.)

The initial data are just now ready to be analyzed statistically, so Dr. Twemlow could not report any conclusions yet. He did confirm that they had observed the rhythmic pattern that occurred in the Langley Porter test we conducted, though his were in the theta frequency range.

The V.A. Hospital tests were not designed to confirm the sleep-induction effects of the taped sounds. To check on this effect, I asked Dr. Twemlow if his subjects ever fell asleep during the test runs. "Oh yes," he said, "they fall asleep all the time."

The V.A. Hospital research is important because it will show if the FFR is one of the mechanisms causing the sleep induction. If so, it connects the sleep-induction method to established scientific knowledge—thus legitimizing it, and enabling us to draw on other research information for ways to develop and improve the technique.

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